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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,813	02/20/2004	Tutomu Ikeda	04022	3953

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EXAMINER	
WHITTINGTON, KENNETH	
ART UNIT	**PAPER NUMBER**
2862	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/01/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/781,813	IKEDA ET AL.	
	Examiner	Art Unit	
	Kenneth J. Whittington	2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 15-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 15-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 January 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The Request for Continued Examination and the Amendment filed therewith have been entered and considered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 25 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 20, from which claim 25 depends, recites that each of the magnets is attached to the magnetic support radial inner surface. Claim 25 recites a yoke positioned between the support and the magnet, which is inconsistent with the noted portion of claim 20. Thus, the claims are unclear as to the scope of these features. For purposes of examination only, claim 25 will be interpreted to recite the support comprises a yoke positioned between the inner radial surface of the magnet support and the outer surface of the magnet.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-9, 11, 12, 16, 17, 19-22 and 27-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki et al. (US5544000), hereinafter Suzuki. Regarding claims 1, 16, 20, 27, 28, 30 and 31, Suzuki discloses a rotation angle sensor comprising:

a magnet support having an inner surface that is radial and an outer surface (See Suzuki FIGS. 1-3, 9, 13, 14, item 4);

at least two magnets attached to the inner surface of the magnet support, so that the magnets produce a magnetic field across a center or rotation, wherein the magnets are made of ferrite-based magnetic materials and have opposite end portions in a circumferential direction about the center of rotation, and wherein the magnets are spaced from each other in the circumferential direction by gaps, further wherein there is no magnetic material along an inner peripheral surface of the at least two magnets, there is no magnetic material between the

poles or inner peripheral surfaces of the magnets in a diametrical direction, and the at least two magnets are not continuous with each other in a circumferential direction, and there is no magnetic material around the sensor (See FIGS. 1-3, 9, 13, 14, magnets 2a-2b about sensor 8a-8b);

a sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic field as the magnets and sensor rotate relative to each other (See FIGS. 1-3, 9, 13, 14, sensor 8a-8b);

wherein the sensor outputs signals representing a relative rotational angle (See col. 5, line 34 to col. 8, line 2).

Regarding claims 2, 3 and 17, Suzuki discloses the magnets disposed substantially symmetrically about the center of rotation and the sensors positioned at substantially the center of rotation (See FIGS. 1-3, 9, 13, 14, magnets 2a-2b and sensor 8a-8b).

Regarding claim 4, Suzuki discloses the magnet support comprises a substantially tubular member, and the at least two magnets are attached to an inner peripheral surface of the tubular member, and the substantially tubular member has a central axis along the center of rotation (See FIGS. 1-3, 9, 13, 14, magnets 2a-2b and support 4).

Regarding claim 5, Suzuki discloses the magnets are magnetized to produce a substantially uniform magnetic field that intersects the sensor, and wherein the substantially uniform magnetic field can be represented by substantially parallel, unidirectional, magnetic field lines intersecting the sensor (See FIGS. 1-3, 8, 9, 13, 14, magnets 2a-2b).

Regarding claim 6, 7, 8, 9 and 29, Suzuki discloses each of the magnets has an arc-shaped configuration along a circumferential direction of the tubular member, the magnets have a uniform thickness in the radial direction of the tubular member, have opposite ends along the circumferential direction, the end surfaces on the inner side of the tubular member (See FIGS. 1-3, 8, 9, 13, 14, magnets 2a-2b).

Regarding claims 11 and 12, Suzuki discloses the magnets extend along an angle measured about the center of rotation, determined such that an error is less than a predetermined value, wherein the angle is determined based on factors comprising offset tolerance of the sensor from center of rotation, magnetic material and thickness of the magnets (See col. 8, lines 17-42, note that the factors would be considered for determinations regarding offset tolerances).

Regarding claim 19, Suzuki discloses the opposing ends of the magnets are substantially orthogonal to an outer

circumferential surface of each of the magnets (See FIGS. 1-3, 8, 9, 13, 14, magnets 2a-2b).

Regarding claims 21 and 22, Suzuki discloses the end portions of the magnets having predetermined configurations based on a central angle about the center of rotation between ends of the magnets (See FIGS. 1-3, 8, 9, 13, 14, magnets 2a-2b).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamaoka et al. (US6483296), hereinafter Hamaoka II, in view of Ooki et al. (US 2002/0121894), hereinafter Ooki.

Regarding claim 1, Hamaoka II teaches a rotary position sensor comprising:

a magnet support having an inner and outer surface (See Hamaoka II FIGS. 18-24, items 24 and 29);

at least two magnets attached to the magnet support symmetrically arranged about the center of rotation, so that the magnets produce a uniform magnetic field across a center of rotation, wherein the magnets have opposite end portions in a circumferential direction about the center of rotation, and wherein the magnets are spaced from each other in the circumferential direction by gaps, further wherein there is no magnetic material along an inner peripheral surface of the at least two magnets, and the at least two magnets are not continuous in a circumferential direction (See FIGS. 18-24, items 145 and 146);

a sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic field as the magnets and sensor rotate relative to each other (See FIGS. 18-24, items 31);

wherein the sensor outputs signals representing a relative rotational angle (See FIGS. 18-24 and see col. 15, line 30 to col. 16, line 57).

However, Hamaoka II does not specifically disclose the material for the magnets. Ooki teaches using ferrite-based magnets in rotary position sensors wherein the magnets are

located on opposite sides of the sensor and rotate with respect thereto (See Ooki FIGS. 1-3, items 4 and 5 and see paragraph 0030). It would have been obvious at the time the invention was made to use ferrite magnets in the sensor assembly of Hamaoka II. One having ordinary skill in the art would have been motivated to do so to provide an economical magnet assembly and reduce the cost of the sensor assembly (See Ooki paragraph 0030).

Regarding claim 2, the noted combination teaches the at least two magnets are disposed substantially symmetrically with respect to the center of rotation (See Hamaoka II FIGS. 18-24, items 39).

Regarding claim 3, the noted combination teaches the sensor is positioned substantially at the center of rotation (See Hamaoka II FIGS. 18-24, item 31).

Regarding claim 4, the noted combination teaches the magnet support comprises a substantially tubular member, and the at least two magnets are attached to an inner peripheral surface of the tubular member, and the substantially tubular member has a central axis along the center of rotation (See Hamaoka II FIGS. 18-24, items 24, 29, 145, 146).

Regarding claim 5, the noted combination teaches the magnets are magnetized to produce a substantially uniform

magnetic field that intersects the sensor, and wherein the substantially uniform magnetic field can be represented by substantially parallel, unidirectional, magnetic field lines intersecting the sensor (See Hamaoka II FIGS. 18-24).

Regarding claim 6, 7, 8, 9 and 10, the noted combination teaches each of the magnets has an arc-shaped configuration along a circumferential direction of the tubular member, the magnets have a uniform thickness in the radial direction of the tubular member, have opposite ends along the circumferential direction, the end surfaces on the inner side of the tubular member, and the end surfaces comprises a first surface and a second surface that are respectively substantially aligned with a direction of the magnetic field and substantially aligned perpendicular to the direction of the magnetic field (See Hamaoka II FIGS. 18-24, items 145 and 146).

Regarding claim 15, the noted combination teaches the Hall IC in the embodiments can be exchanged with a magneto resistance element (See Hamaoka II col. 17, lines 10-22).

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki. Regarding this claim, it is noted that Suzuki is concerned with making a uniform field between the magnets so that if the sensor at a specific offset from the

center of rotation, it will still be in the uniform field and the errors associated therewith will be compensated (See Suzuki at least at col. 8, lines 17-42). However, Suzuki does not disclose any particular offset distance. Nonetheless, it would have been obvious at the time the invention was made to use the recited dimension for the offset because where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *See* MPEP 2144.05II(A). Furthermore, modifying Suzuki such the maximum offset has the relative dimensions recited in the claim would be obvious to one having ordinary skill in the art through routine experimentation because where the where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device. *See Gardner v. TEC Systems*, Inc., 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 225 USPQ 232 (1984). One having ordinary skill to modify Suzuki as noted would be motivated to do so to allow for off center placement of the sensor while still maintaining accurate rotational measurements, the offset being determined

based on the needed requirements or tolerances of the sensor assembly.

Claims 18 and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki in view of Hamaoka II.

Regarding claims 18, 23 and 24, Suzuki teaches the features as noted above, except for the end portions as recited in these claims. Hamaoka II teaches each end of the magnet having a surface that is substantially perpendicular to the direction of the magnetic field and a surface that is substantially parallel to the magnetic field across a center of rotation, such that the surface are inclined to the inner and outer surfaces of the magnets by obtuse angles (See Hamaoka II FIGS. 18-24, note particularly FIGS. 21A-21C). It would have been obvious at the time the invention was made to incorporate the magnets with the recited ends as taught by Hamaoka II in the sensor apparatus of Suzuki. One having ordinary skill in the art would have been motivated to do because magnets of these shapes and magnetizations increase the angular range of the sensor (See Hamaoka II col. 15, line 32 to col. 16, line 57).

Regarding claims 25 and 26, as best understood in view of the 112 rejections noted above, Suzuki teaches the features noted above, except for a support having an inner yoke and outer

housing. Hamaoka II teaches a rotary position sensor having a pair of arc shaped magnets attached to the inner surface of a cylindrical ferrite yoke which is surrounded by a cylindrical resin housing (See FIGS. 18-24, note magnets 145 and 146, yoke 24 and support 29). It would have been obvious at the time the invention was made to incorporate the magnet-yoke-housing as taught by Hamaoka II into the sensor of Suzuki. One having ordinary skill in the art would have been motivated to do so to mold these pieces into a single structure (See Hamaoka II col. 12, lines 20-25), which simplifies manufacturing and protects the magnetic materials from damage during construction of the sensor.

Response to Arguments

Applicant's arguments with respect to the claims in general have been considered but are moot in view of the new grounds of rejection as noted above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J. Whittington whose telephone number is (571) 272-2264. The

examiner can normally be reached on Monday-Friday, 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kenneth J Whittington
Examiner
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